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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/809,772	03/16/2001	Toshihiro Murayama	09792909-4792	8782

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EXAMINER

PATEL, ISHWARBHAI B

ART UNIT	PAPER NUMBER
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2841

DATE MAILED: 12/06/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/809,772

Applicant(s)

MURAYAMA ET AL.

Examiner

Ishwar B Patel

Art Unit

2841

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 March 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

DETAILED ACTION

Drawings

1. Figures 9-10 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al., US Patent No. 5,994,166, hereafter referred to as Akram, in view of Tokuno et al., US Patent No. 5,883,426, hereafter referred to as Tokuno.

Regarding claims 1 and 5, Akram discloses an electronic circuit device including a plurality of circuit boards which have electronic parts mounted thereon and are three-dimensionally assembled, characterized in that said plural circuit boards are stacked in the thickness direction through metal pieces at least one ends of which are fixed to the circuit boards (substrate 402, 440 and 462 stacked one above the other with electric connection 450 and 472, electric connection made with solder forming technique, see figure 4, column 7, line 26 to column 8, line 24 and column 3, line 55-60). Though

Akram discloses the electric connection formed by the soldering technique, fail to explicitly disclose the same as a separate metal piece. However Tokuno discloses a stack module using copper ball as a connection bump for better heat dissipation rate and mechanical strength. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the assembly of Akram stacked with metal piece as taught by Tokuno in order to have the assembly with a better electrical and mechanical strength.

4. Claims 2-4, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the modified assembly of Akram and Tokuno as applied to claim 1 above, and further in view of Satoh et al., US Patent No. 5,276,289, hereafter referred to as Satoh.

Regarding claim 2 and 6, the applicant is claiming both the ends of each metal piece are fixed to said circuit boards at both the side thereof by materials, which are different in melting point. Though the modified assembly of Akram and Tokuno does not disclose using the material with two different melting point. The use of material with two different melting points is known in the art for facilitating easy assembly of the various components in different steps. Further, Satoh discloses the use of solder with different melting point for connecting plurality of parts and electronic components. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified assembly of Akram and Tokuno with both the ends of each metal pieces fixed to said circuit boards at both the side thereof by materials which

are different in melting point in order to facilitate the assembly in various steps, avoiding damage to previously assembled parts.

Regarding claim 7, the applicant is claiming the electronic parts are soldered with solder having higher melting point as that of one on one end of the metal piece. Though the modified assembly of Akram and Tokuno fail to disclose explicitly about the type of solder used for the electronic parts, as explained against claim 2 and 6 above, Satoh discloses use of solder with differing melting point to facilitate the installation of the various parts and component in various steps without causing damage to the parts installed previously. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified assembly of Akram and Tokuno with electronic parts soldered with solder having higher melting point as that of one on one end of the metal piece in order to facilitate the assembly in various steps, avoiding damage to previously assembled parts while soldering the other end of the metal piece.

Regarding claim 3 and 4, modified assembly of Akram, Tokuno and Satoh discloses all the features of the claimed invention as shown above except the metal piece is fixed on one end with solder and the other end with an adhesive agent with melting point lower than the solder as claimed in claim 3 and the said adhesive agent is a conductive adhesive as claimed in claim 4. However the use of conductive adhesive is known in the art for electrical and mechanical connection of the parts and component.

Further, Akram does disclose the use of a solder, conductive adhesive, Z-axis conductive material etc. for electric connection having a sufficient height to give clearance for the components mounted on the substrates and strong enough to give support between the stacked substrates. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified assembly of Akram and Tokuno with the metal piece fixed on one end with solder and the other end with an adhesive agent with melting point lower than the solder as claimed in claim 3 and the said adhesive agent is a conductive adhesive as claimed in claim 4, in order to facilitate the easy assembly of the component in various steps with enough strength to support the printed wiring board. Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tsukamoto, Liang et al., Portman et al., Corisis et al., Dibene, II et al., Kumagai et al., Kwon et al., Tamarkin et al., Gochi et al., disclose the stacked assembly similar to applicant's claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar B Patel whose telephone number is (703) 305 2617. The examiner can normally be reached on M-F (6:30 - 4) First Friday Off.

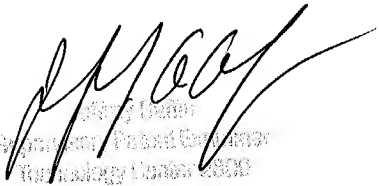
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey Gaffin can be reached on (703) 308 3301. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305 3431 for regular communications and (703) 305 7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

ibp
November 26, 2001



Jeffrey Gaffin
Supervisor, Patent Examiner
Technology Center 2800